CLAIMS:

1. An apparatus for forming an optical image in a radiation-sensitive layer, which apparatus comprises:

- a radiation source for supplying an exposure beam of radiation;
- positioning means for positioning a radiation sensitive layer with respect to the radiation beam;
- an array of individually controllable light valves arranged

between the radiation source and the location for the radiation-sensitive layer, and

- a two-dimensional array of converging elements arranged on a converging plate between the array of light valves and the substrate holder such that each converging element corresponds to a different one of the light valves and serves to converge exposure beam radiation from the corresponding light valve in a spot area in the radiation-sensitive layer, characterized by monitoring means for individually monitoring the spots formed by the convergent elements and/or for determining the positions of these spots with respect to the radiation sensitive layer, which means are arranged downstream the array of convergent elements and use the exposure beam radiation.

2. An apparatus as claimed in claim 1, characterized in that the monitoring means comprises a movable module, which is provided with a slit plate comprising an array of slits and with a corresponding array of radiation detectors in register with the slits.

3. An apparatus as claimed in claim 2, characterized in that the slit plate comprises a first and a second series of slits whereby the slits of the first and second series extend in different directions with respect to the direction of movement of the sensing module.

4. An apparatus as claimed in claim 3, characterized in that the slits of the first series and the slits of the second series extend in a direction at a first sharp angle and in a direction at a second sharp angle, opposed to the first sharp angle, respectively the said direction of movement.

5. An apparatus as claimed in claim 2, 3 or 4, characterized in that the sensing module comprises at least one X-position encoder and at least one Y- position encoder, and in that the converging plate is provided with at least one X-tracking configuration and at least one Y-tracking configuration.

6. An apparatus as claimed in claim 5, characterized in that the sensing module comprises two X-position encoders and two Y-position encoders, and in that the converging plate is provided with two X-tracking configurations and two Y-tracking configurations.

7. An apparatus as claimed in claim 4 or 5, characterized in that the converging plate comprises a number of alignment marks to co-operate with corresponding alignment marks on the substrate

8. An apparatus as claimed in claim 7, characterized in that the alignment marks are arranged close to the tracking configurations.

9. An apparatus as claimed in any one of claims 1-8, characterized in that the converging elements are diffraction elements.

10. An apparatus as claimed in any one of claims 1-8, characterized in that the converging elements are refractive lenses.

11. An apparatus as claimed in any one of claims 1-10, characterized in that the array of converging elements faces the array of light valves without intervening imaging elements.

12. An apparatus as claimed in any one of claims 1-10, characterized in that an optical projection system is arranged between the array of light valves and that array of converging elements.

13. An apparatus as claimed in any one of claims 1-12, forming a lithographic tool for producing a device in at least one layer of a substrate, characterized in that the radiation-sensitive layer is a resist layer on top of a substrate layer to be configured, in that the image

corresponds to the pattern of device features to be configured in said substrate layer and in that the positioning means is a substrate holder carried by a substrate stage.

14. An apparatus as claimed in any one of claims 1-12, for printing data on a sheet of paper, characterized in that the radiation-sensitive layer is a layer of electrostatic charged radiation-sensitive material and in that the positioning means are means for moving said layer with respect to the array of light valves and the array of converging elements and for sustaining said layer at the location of the image field of this array.

15. A method of forming an optical image in a radiation sensitive layer, the method comprising the steps of:

- providing a radiation source for generating a beam of radiation;
- providing a radiation sensitive layer;
- positioning an array of individually controlled light valves between the radiation source and the radiation sensitive layer;
- positioning a two-dimensional array of radiation converging elements between the array of light valves and the radiation sensitive layer such that each of these elements corresponds to a different one of the light valves and serves to converge radiation from the corresponding light valve in a spot in the radiation sensitive layer;
- simultaneously writing image portions in radiation sensitive layer areas by scanning said layer areas at the one hand and the associated light valves/converging element pairs at the other hand relative to each other and switching each of the light valves between on and off states in dependency of the image portion to be written in by the light valve, characterized in that, prior to writing an image in the radiation-sensitive layer, all light valves are switched on and a control process is carried out to determine parameters of the individual spots and/or the positions of these spots with respect to the radiation-sensitive layer.

16. A method as claimed in claim 15, characterized in that the control process comprises the step of scanning the array of spots and a measuring module comprising an array of slits and a corresponding array of radiation detectors with respect to each other.

17. A method as claimed in claim 16, characterized in that the control process comprises the step of determining the position of the measuring module with respect to the

lens array by measuring the positions of linear encoders included in the module with respect to tracking configurations in the converging plate.

18. A method as claimed in claim 17, characterized in that the control process comprises the step of determining the positions of the spots with respect to the radiation-sensitive layer by measuring the positions of alignment marks, which are included in the converging plate, with respect to corresponding alignment marks in the substrate.

19. A method as claimed in claim in any one of claims 15-18, characterized in that said scanning is such that each spot scans its own associated layer area, which area has dimensions corresponding to the pitch of the matrix of spots formed by array of converging elements.

20. A method as claimed in any one claims 15-18, characterized in that the matrix of spots and the radiation sensitive layer are scanned relative to each other in a direction at a small angle to the direction of the lines of spots in the matrix and in that the scanning is carried out over a length substantially larger than the matrix pitch.

21. A method as claimed in any one of claims 15-20, characterized in that the between successive sub-illuminations the radiation-sensitive layer and the arrays are displaced relative to each other over a distance, which is at most equal to the size of the spots formed in the radiation sensitive layer.

22. A method as claimed in any one of claims 15-21, characterized in that the intensity of a spot at the border of an image feature is adapted to the distance between this feature border and a neighbouring feature.

23. A method as claimed in any one of claims 15-22, forming part of a lithographic process for producing a device in at least one layer of a substrate, characterized in that the radiation sensitive layer is a resist layer provided on the substrate layer to be configured and in that the image corresponds to the pattern of device features to be configures in the substrate layer.

24. A method as claimed in claim 23, characterized in that the image is divided in sub-images each belonging to a different level of the device to be produced and in that during formation of the different sub-images the resist layer surface is set at different distances from the array of refractive lenses.

25. A method as claimed in any of claims 15-22, forming part of a process for printing a sheet of paper, characterized in that the radiation sensitive layer is a layer of electrostatic charged material.

26. A method of manufacturing a device in at least one layer of a substrate, the method comprising the steps of:

- forming an image in a radiation-sensitive layer provided on the substrate layer, which image comprises features corresponding to device features to be configured in the substrate layer and
- removing material from, or adding material to, areas of the substrate layer, which areas are delineated by the image formed in the resist layer, characterized in that the image is formed by means of the method as claimed in any one of claims 15-22.